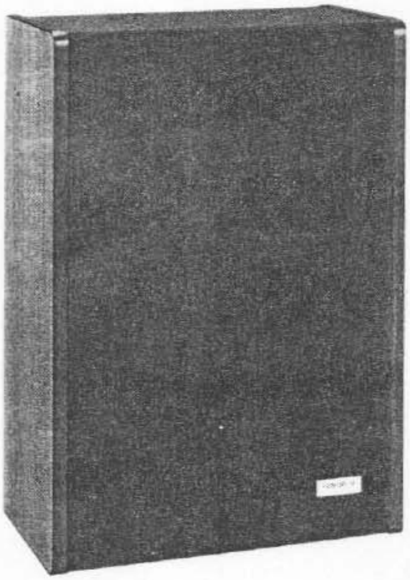
Electro-Voice®
a gulton company

Sentry® V Two-Way Professional Monitor System



ST 350
OEM 10"
Cadenza

SPECIFICATIONS

Frequency Response, 1 Meter on Axis, Half-Space Anechoic Environment, Swept One-Third-Octave Random Noise ± 3 dB
- 45 to 18,000 Hz
  - Normal Mode
- 32 to 18,000 Hz
  - Step-down Mode with EQ

Usable Lower Limit Frequency
- Normal
  - 35 Hz
- Step-down
  - 30 Hz

Half-Space Reference Efficiency
- 1.6%

Dispersion Angle Included by 6-dB-Down Points, 10 Foot Microphone Distance, Anechoic Environment, One-Third-Octave Bands of Random Noise
- Horizontal, (400-16,000 Hz Average)
  - 126° ± 31°
- Vertical, (4,000-16,000 Hz Average)
  - 66° ± 16°

Maximum Midband Acoustic Output Power
- 0.48 watt

Crossover Frequency
- 2 kHz

Amplifier Power Requirements:
- Medium Level (85 dB SPL)
  - 0.8 watt
- Loud Level (95 dB SPL)
  - 8 watts
- Very Loud Level (105 dB SPL)
  - 80 watts
- Maximum Level (111 dB SPL)
  - 300 watts

Continuous Average at 6 Ohms, for the Following Average Sound Pressure Levels, Mid-Band, in the Reverberant Field of a Typical Living Room (3,000 cu ft, R = 200) with Peaks 10 dB above Average (Long-Term Average Power Capacity not to be exceeded)

Sound Pressure Level at 1 Meter, 1Watt into Nominal Impedance Anechoic Environment, 300-2,000 Hz Average
- 96 dB

EIA Sensitivity Rating (on axis measurements):
- 46.8 dB

Long-Term Average Power-Handling Capacity
- 40 to 10 kHz
  - 30 watts

Short-Term Power-Handling Capacity (10 Milliseconds)
- 40 to 10 kHz
  - 300 watts

Nominal Impedance
- 6 ohms

Minimum Impedance
- 4 ohms

Dimensions
- 72.4 cm (28½") high
- 50.8 cm (20") wide
- 29.8 cm (11¾") deep

Net Weight
- 23.6 kg (52 lbs)

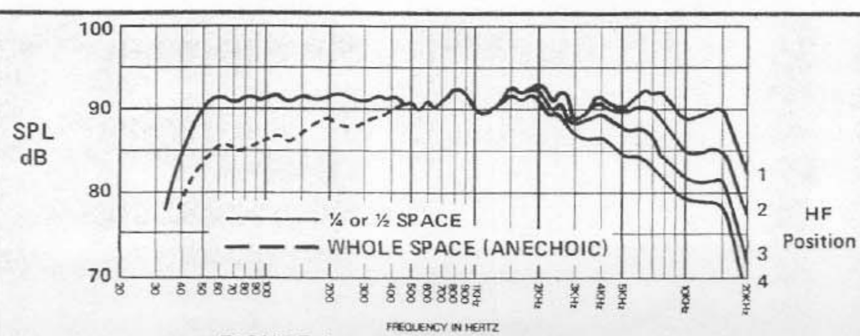


FIGURE 1 – Axial Frequency Response (4 volts/3 meters)

DESCRIPTION

The Sentry V is one of a generation of high-technology monitor speaker systems resulting from a combination of creative engineering and critical listening. The Sentry V, designed to replace the Sentry IA and IIA, is directly descended from the Sentry III, using the same high frequency horn tweeter, and Thiele technology for low-frequency performance. The Thiele-tuned low frequency section permits a reduction in overall size of more than 30% and extends low frequency performance more than 15 Hz relative to the Sentry IA and IIA.

The low-frequency section is driven by a newly designed 10 inch direct radiator woofer installed in a vented enclosure with fourth order Butterworth tuning.[1]

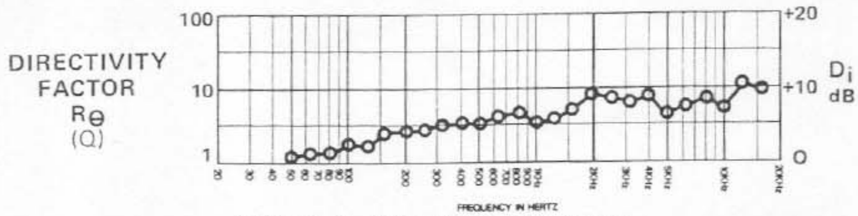


FIGURE 2— Directivity vs Frequency

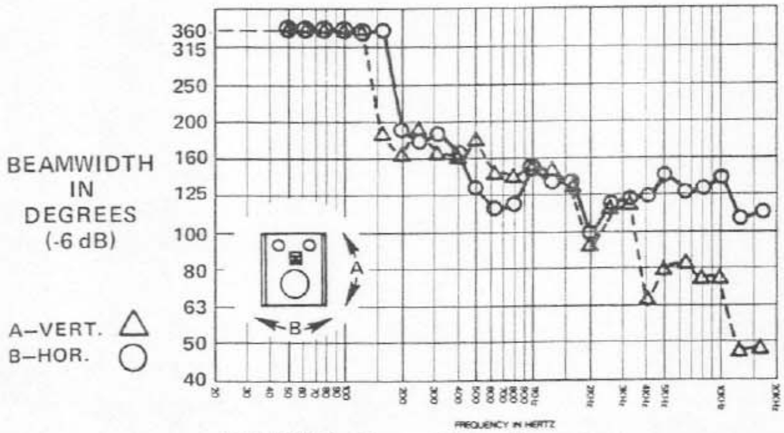


FIGURE 3— Beamwidth vs Frequency

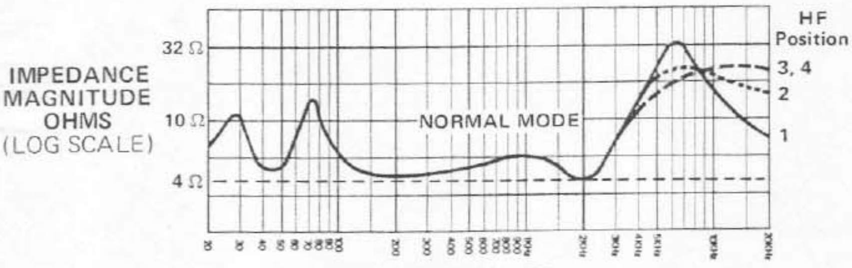


FIGURE 4— Impedance vs Frequency

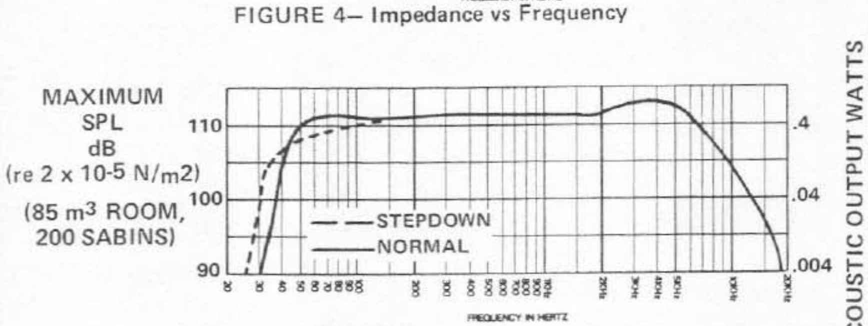


FIGURE 5— Maximum Acoustic Output

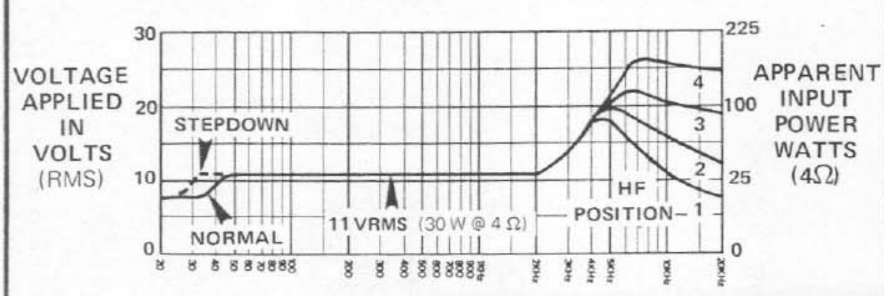


FIGURE 6— Maximum Sinewave Power Input

The vented enclosure technology employed permits an exceptionally small enclosure for the low frequency performance enjoyed, and (voltage) efficiency is similar to that of the Sentry III. Such low frequency response and efficiency is simply not available in other boxes of this size. Throughout the rest of the frequency range the two-way Sentry V has remarkably uniform dispersion and total acoustic power output.

The Sentry V is housed in a dark cabinet with handsome oak side panels. The grille treatment and cabinet make this system equally as appropriate for demanding home installations as for professional monitoring. The enclosure is also designed in such a way as to allow the tweeter to be rotated 90 degrees so that the box may be used with its long dimension either vertical or horizontal. Since the (voltage) efficiency of the Sentry V is a full 10 dB higher than most bookshelf hi-fi speaker systems, it offers a unique opportunity to reproduce without clipping and with amplifiers of practical size, the 104 to 110 dB peak sound pressure levels characteristic of live music.[2]

TWEETER PROTECTION

A tweeter protection device is provided (internally mounted) to allow maximum performance without tweeter damage. The device senses for maximum safe voltage to the tweeter and opens the tweeter circuit (variable speed relay) if that voltage is exceeded. When safe voltage is resumed, the tweeter is instantly brought back into the circuit.

A purely electrical system of protection would sense for a given voltage and disconnect the tweeter. However, the protection device used in the Sentry V employs not only electrical sensing components, but a selected relay which is voltage/duration sensitive. Program material may have high frequency "spikes" or transient surges of very short duration which will exceed the average voltage level. The protection circuit will pass short surges (which will not damage the tweeter) while not allowing the same voltage with a longer duration to reach the tweeter. This effectively extends the dynamic range of the entire system.

NOTE: When the system is operating at high power threshold, the tweeter may switch in and out with a clicking sound. If this is objectionable, either reduce the power or roll the tweeter off with the attenuator switch.

SPECIAL TERMINALS: A special provision has been made for modifying the action of the tweeter protector in the Sentry V. Looking at the terminals at the rear of the Sentry V enclosure,

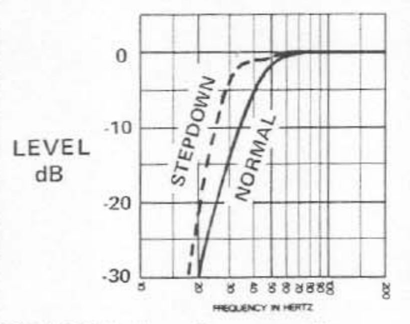


FIGURE 7—Low-Frequency Response

you will note two terminals labeled, "special terminals." It is at this point, when the tweeter protector activates, that the above-described open circuit occurs. By inserting a special light bulb in the line at this point (12 V to 28 V No. 307 aircraft lightbulb) the tweeter will not be turned off when the tweeter protector activates, but rather will drop approximately 10 dB in level. Then, as even more power is added, the tweeter output will remain nearly constant and the lightbulb will get brighter. Note: only a No. 307 lightbulb may be used for proper results. DO NOT insert a fuse at these terminals. By following these directions you will not only have excellent tweeter protection, but also a visual indicator of excessive power to the tweeter.

POWER HANDLING CAPACITY

Power handling specifications are usually meaningless because they fail to indicate the nature of the test signal and/or how this test signal relates to actual use. The 30-watt specification for the Sentry V is based on filtered random noise (FM interstation noise and tape hiss are common forms of random noise), which is fed to the speaker for an extended time (more than 15 hours).

Random noise testing is used because, like real music and speech program material, it contains many frequencies at once. Low frequencies, which cause large excursions of the woofer suspension are present as well as mid-bass frequencies which contribute mainly to woofer voice coil heating. Thus the woofer is simultaneously tested for mechanical fatigue and voice coil overheating. Similarly, the tweeter is tested for both mechanical and thermal failure at appropriate power levels.

There is no generally accepted standard for testing loudspeakers for power capacity. At Electro-Voice, we expect each speaker and system to survive 15 hours continuous application of rated power without failure of any component or permanent change in performance.

One noise test standard, the West German D.I.N. 45573, specifies the random noise spectrun shown in Figure 8. This spectrum agrees approximately with studies of voice and music spectra that appear in several textbooks on acoustics [4, 5]. However, only about 1% of the power applied to a Sentry V would be in the range of the tweeter using this spectrum. A system input of 30 watts would therefore test the tweeter with 0.3 watts of random noise. Obviously this would not be a very severe test particularly in light of the wide band nature of rock and synthesized music.

A study done by John P. Overley of Electro-Voice[6] resulted in the more realistic spectrum of Figure 9.

The curve shows the relative levels in octave bands of average peak energy found in many musical passages of a symphony orchestra. "Based upon peaks as short as a fraction of a second in duration . . . it represents the approximate distribution of energy vs. frequency under highest signal conditions . . . exactly those conditions which should determine the power handling requirements of audio components."[7] The musical passages were taken from disc recordings that were played back on "carefully equalized high quality transcription equipment."[8]

The test signal actually used in developmental testing of the Sentry V is shown in Figure 10. It is an approximation to measured spectra of the output of a lead guitar amplifier driven into heavy clipping, and represents a worst case situation. The Sentry V will survive 30 watts of this input for at least 15 hours. Using this spectrum, 17% of the power is in the tweeter passband or 5 watts in the case of a 30-watt system input.

The power handling specification applies to long term application of power; for short duration peaks the loudspeaker system is capable of handling many times the rated power. For example: for a few milliseconds the system will handle 10 dB peaks. If the average input power level were 30 watts then it would handle peak power inputs on the order of 300 watts.

Figure 6 shows continuous sine wave power handling with relation to frequency. The graph is designed to be used to calculate power handling when unusual program sources with substantial high frequency energy are anticipated.

STEP-DOWN KIT

The Sentry V as supplied, is 3 dB down at 45 Hz (see Fig. 7). It is possible to extend this 3 dB down point to 32 Hz by means of an accessory electronic

FIGURE 8 – Random Noise Spectrum Specified by D.I.N. 45573 for Power Testing of Loudspeakers (1/10 octave analyzer)

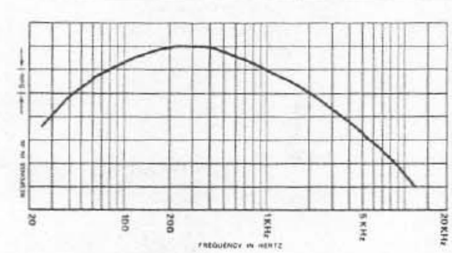


FIGURE 9 – Ensemble Average of Peak Energy Levels (relative), Symphony Orchestra

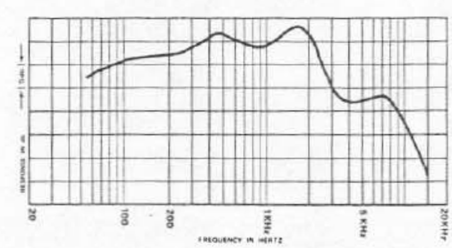
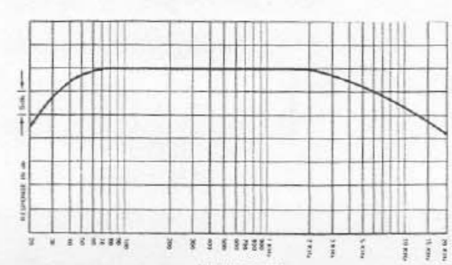


FIGURE 10 – Random Noise Spectrum for Testing Sentry V (1/10 octave analyzer)



equalizer available from Electro-Voice plus the port cover supplied with the Sentry V. The port cover is attached by four screws to the cabinet face, between the two vents. As a part of the step-down procedure, the port cover is removed from its storage position and placed over the right-hand port. The same screws are used to fasten it firmly enough to compress the gasket material.

The electronic equalizer provides a modest amount of low frequency boost (maximum, 6 dB at 34 Hz) without any radical change in harmonic distortion. The step-down configuration somewhat reduces the maximum acoustic output capabilities of the system in the 50 to 100 Hz region (maximum loss of 2.5 dB at 70 Hz), but greatly increases the maximum output below 40 Hz (gain of 12 dB at 32 Hz). See Figure 5 for a complete plot of the Sentry V's maximum output. Keep in mind that this loss does not affect frequency response which remains the same as the standard Sentry V with a one-half octave linear extension of bass response. **DO NOT use port cover without equalizer.**

CROSSOVER NETWORK

The integral crossover network is a 12 dB/octave one section type, crossover occurring at 2 kHz. The network includes provision for a screwdriver-adjustable, four position switch located behind the grille cloth next to the tweeter. The grille cloth assembly is held on with fasteners so that removal and replacement is accomplished without tools and with little effort. The maximum clockwise position, No. 1, is the flat position while positions 2, 3, and 4 cause progressively greater rolloff as shown in Figure 1. **This high frequency rolloff might be desired to account for different environments and listening tastes.**

ENVIRONMENTS

The Sentry V professional system was designed for ¼ to ½ space use. (System coupled to — in near proximity to — floor or wall or both.) The unit should be as close to reflecting planes (floor and wall) as possible so that out-of-phase low frequency irregularities from near reflecting surfaces may be reduced. Cavities around the device are undesirable as resonances may be excited, causing degradation of the system frequency response.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

Speaker shall be a 2-way, wide-range system. High frequency driver shall be horn-loaded. Low frequency assembly shall consist of a 10-inch woofer and a vented enclosure. The high frequency unit shall consist of a 120° sectoral tweeter with integral driver. Electrical crossover frequency shall be 2 kHz. Low frequency cutoff shall occur at 45 Hz. Frequency response shall be smooth (in ¼ to ½ space coupling) from 45 Hz to 18,000 Hz. Dispersion of the system shall be uniform with no lobes from 600 Hz to 18,000 Hz. Horizontal dispersion shall be 110°, with vertical dispersion not less than 50°.

A tweeter protector shall be provided to protect the tweeter from surges of excess power. It shall automatically disconnect the tweeter as power exceeds the tweeter's power handling capacity (see Figure 6) and reconnect the tweeter when power levels are safe.

With no high-frequency rolloff, power handling shall be 30 watts continuous (4 ohm nominal load) using a suitable noise input shaped as in Figure 10. Sentry V is specified.

WARRANTY (Limited) —

Electro-Voice Sentry Loudspeakers and accessories are guaranteed for five years from date of original purchase against malfunction due to defects in workmanship and materials. If such malfunction occurs, unit will be repaired or replaced (at our option) without charge for materials or labor if delivered prepaid to the proper Electro-Voice service facility. Unit will be returned prepaid. Warranty does not cover finish or appearance items or malfunction due to abuse or operation at other than specified conditions. Repair by other than Electro-Voice or its authorized service agencies will void this guarantee.

For shipping address and instructions on return of Electro-Voice products for repair and locations of authorized service agencies, please write: Service Department, Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan 49107 (Phone: 616/695-6831).

Electro-Voice also maintains complete facilities for non-warranty service.

Specifications subject to change without notice.

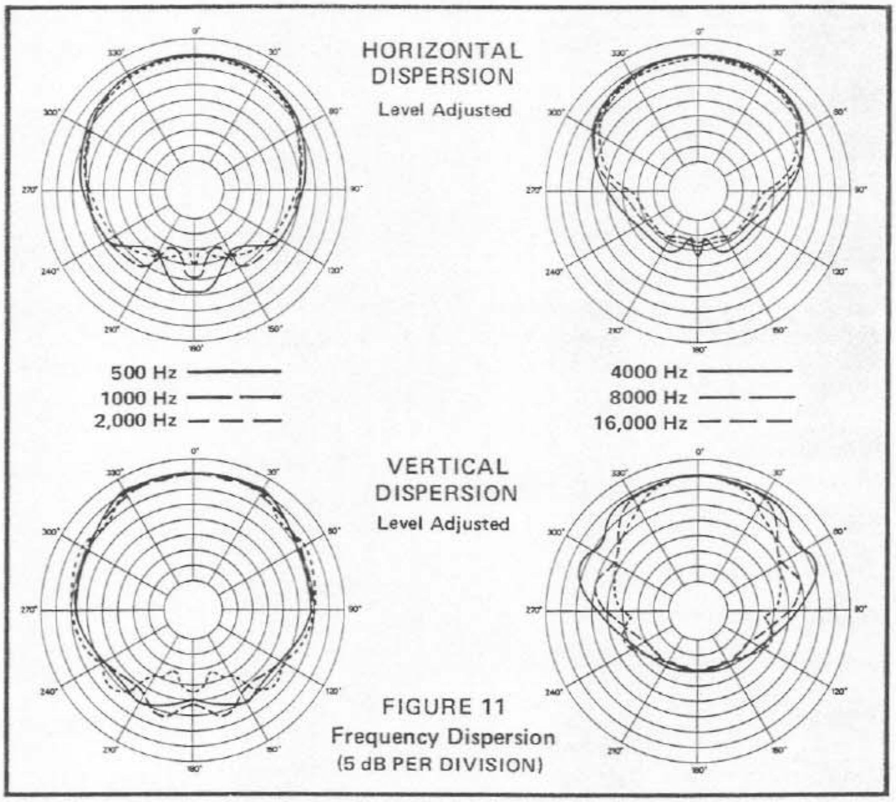
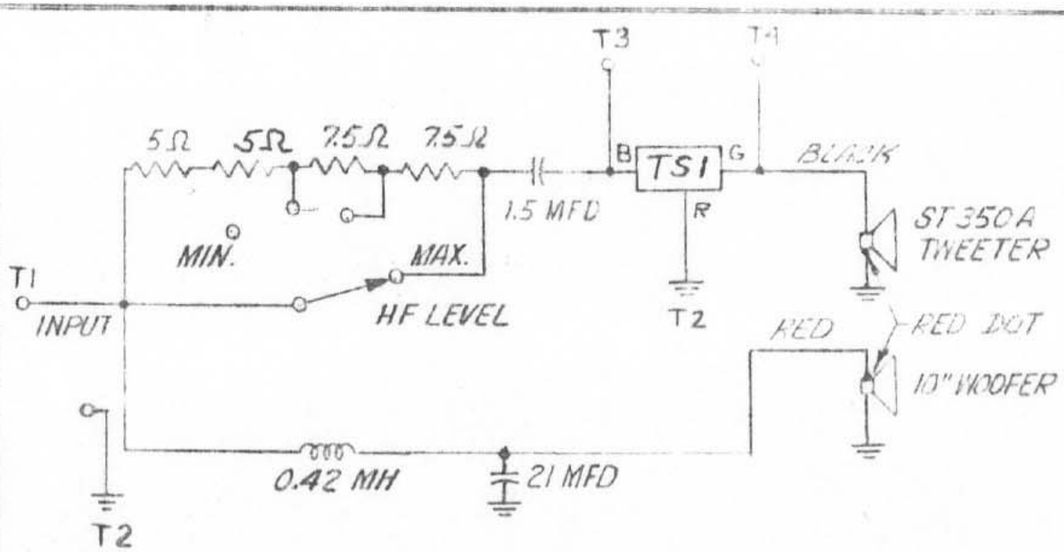


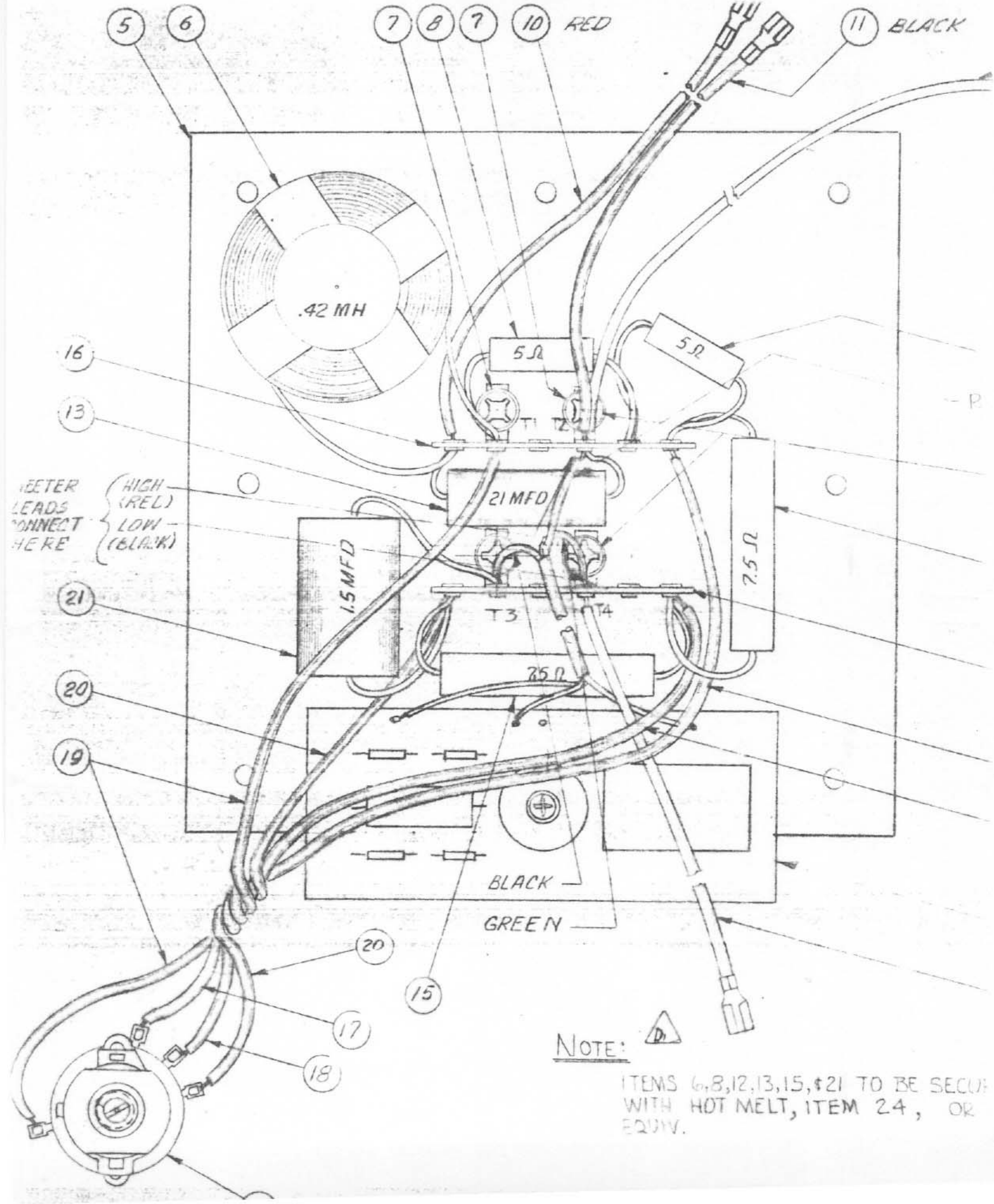
FIGURE 11
Frequency Dispersion
(5 dB PER DIVISION)

1. A.N. Thiele, "Loudspeakers in Vented Boxes: Part I," J. AUDIO ENGINEERING SOCIETY, Vol. 19, No. 5, pp. 386-387 (1971)
2. F. Messa, ACOUSTIC DESIGN CHART (Blakiston Co., Philadelphia, Pa., 1942)
3. A. N. Thiele, "Loudspeakers in Vented Boxes: Part II," J. AUDIO ENGINEERING SOCIETY, Vol. 19, No. 6, p. 472 (1971)
4. H. F. Olson, PhD., "Acoustical Engineering" (D.Van Nostrand Company, Inc., Princeton, New Jersey, p. 588, 1957)
5. L. Beranek, "Acoustics" (McGraw-Hill Book Company, New York, p. 338, 1954)
6. John P. Overley, "Energy Distribution in Music," IRE Transactions on Audio, Vol. AU-4, No. 5, Sept.—Oct., (1956)
7. Ibid. Pg. 121
8. Ibid. Pg. 121



WIRING DIAGRAM SENTRY V

SBD-10-5155



NOTE: D

ITEMS 6,8,12,13,15,&21 TO BE SECU
WITH HOT MELT, ITEM 24, OR
EQUIV.